

IN THE CLAIMS:

Please cancel claim 1.

Add the following new claims:

8. (New) A semiconductor device including

a variable capacitor, the variable capacitor comprising:

a first semiconductor layer of a first conductivity type provided in a

semiconductor substrate; and

a second semiconductor layer of a second conductivity type formed on the first semiconductor layer so as to project from a surface of the semiconductor substrate.

9. (New) The semiconductor device according to claim 8, wherein an impurity concentration of the first conductivity type in the first semiconductor layer gradually reduces from the surface of the semiconductor substrate toward the inside thereof.

10. (New) The semiconductor device according to claim 8, further comprising a bipolar transistor having

a collector layer comprised of a third semiconductor layer of a first conductivity type;

a base layer comprised of a fourth semiconductor layer of a second conductivity type formed on the third semiconductor layer; and

an emitter layer of a first conductivity type formed on the fourth semiconductor layer,

wherein the collector layer is provided in the semiconductor substrate, and the base layer is formed on the collector layer so as to project from the surface of the semiconductor substrate.

11. (New) The semiconductor device according to claim 10, wherein an impurity concentration of the first conductivity type in the collector layer gradually increases from the surface of the semiconductor substrate toward the inside thereof.

12. (New) The semiconductor device according to claim 8, wherein the first semiconductor layer is a Si layer, and the second semiconductor layer is a SiGe or SiGeC layer.

13. (New) The semiconductor device according to claim 11, wherein the third semiconductor layer is a Si layer, and the fourth semiconductor layer is a SiGe or SiGeC layer.

14. (New) The semiconductor device according to claim 8, further including an oscillation circuit, wherein the variable capacitor is connected to the oscillation circuit.

15. (New) A method for manufacturing a semiconductor device including a variable capacitor and a bipolar transistor on a common semiconductor substrate, comprising the steps of:

(a) forming a first semiconductor layer of a first conductivity type on a surface of the semiconductor substrate in a region where the variable capacitor is to be formed, and forming a collector layer of a first conductivity type on the surface of the semiconductor substrate in a region where the bipolar transistor is to be formed;

(b) after the step (a), forming a second semiconductor layer of a second conductivity type on the first semiconductor layer in a region where the variable capacitor is to be formed by an epitaxial grown method so as to project from the surface of the semiconductor substrate, and forming a base layer of a second conductivity type on the collector layer in a region where the bipolar transistor is to be formed by an epitaxial grown method so as to project from the surface of the semiconductor substrate, and

(c) forming an emitter layer on the base layer.

16. (New) The method according to claim 15, between the step (a) and (b), further comprising a step of diffusing the impurity concentration of the first conductivity type in the first semiconductor layer by heating the semiconductor substrate so as to be gradually reduced from the surface of the semiconductor substrate toward the inside thereof.

17. (New) The method according to claim 15, wherein the first semiconductor layer is a Si layer, and the second semiconductor layer is a SiGe or SiGeC layer.

18. (New) The method according to claim 15, wherein the collector layer is a 5i layer, and the base layer is a SiGe or SiGeC layer.

19. (New) The method according to claim 15, further including an oscillation circuit, wherein the variable capacitor is connected to the oscillation circuit.